

2. Surveying the Latin American Infrastructure

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The Internet made a late start in Latin America and was introduced primarily through the region's universities -- which formed ENRED ("on the Net," or "connected"), an association of networks, in 1991. Since 1991, ENRED has met eight times, although not since 1998. Efforts to form a Latin American Network Information Center and assign IP numbers in the region have yet to succeed. Yet, while the Internet came late to and is still small in Latin America, its growth is impressive. Between 1999 and 2000, international bandwidth in the region increased 47 percent, from 48.3 mbps to 71.0 mbps. While these figures are dwarfed by increases in the U.S./Canada and Europe (178 percent and 102 percent, respectively), the bandwidth increase in Latin America in recent years is notable: In October 1996, for example, only Mexico had an international Internet connection exceeding one mbps.

Latin America, including the Caribbean, is extremely diverse in economic development and in both technological and socioeconomic infrastructure. Figure 2.1 presents one measure of this diversity, showing the range of GDP per capita across Latin America. Another measure of this diversity is the Human Development Index (HDI), developed by the United Nations Development Program. The HDI ranks countries in terms of life expectancy, educational attainment and adjusted real income. Predictably, within Latin America, Argentina, Chile, and Uruguay, along with Mexico and Venezuela, rank higher than Peru, Ecuador, Colombia, and most of the countries of Central America.⁵

⁵ The 1999 HDI rankings of the Latin American nations are presented in UNDP (1999).



Figure 2.1 GDP Per Capita (USD \$), 1998

There are grounds for skepticism about all numbers, including the HDI, and because IT is growing so fast, numbers about it are especially suspect. For instance, the “number of Internet users” throughout the region is widely cited. Nua Internet Surveys estimates that approximately 15.3 million Latin Americans were online in October 2000 (as shown in Figure 2.2); the Computer Industry Almanac projects that Latin America will have approximately 100 Internet users per 1000 individuals by the year 2005.

But what constitutes a user? Is an Internet “user” someone who logs on twice a year? One count had 15 million users in Latin America, but another at the same time found 14 million in Brazil alone. There is no common definition of “user,” and most surveys, including those cited here, collect what news and other reports are available. With this in mind, comparisons are probably safer than any point statistics. The safest conclusions are that: (a) Latin America is a very diverse region, in general; (b) users and hosts in Latin America are small in comparison to the rest of the world but growing rapidly; and (c) differences in IT among Latin American countries are striking. The southern cone, plus Mexico, is the (relative) advance guard. Figures 2.1 through 2.5 demonstrate all three of these points.

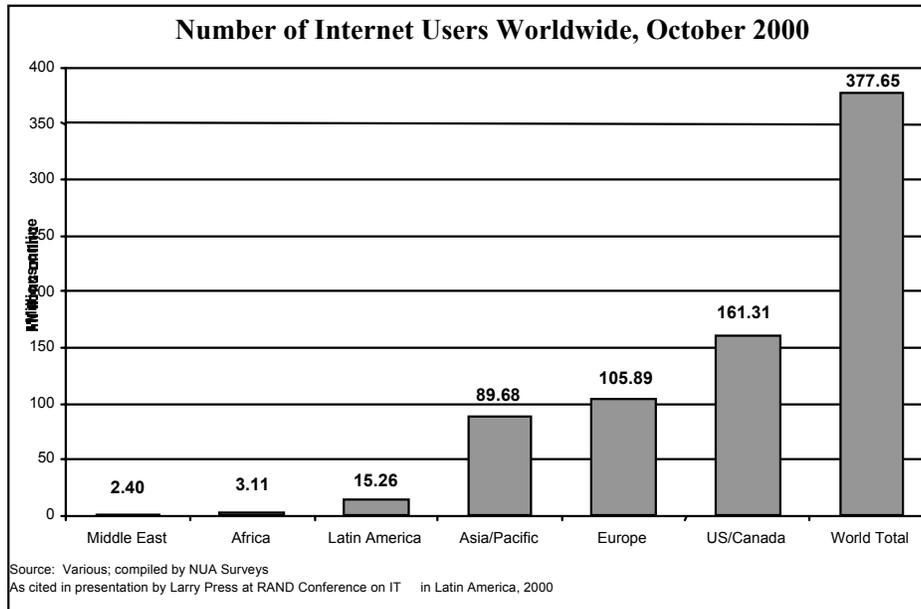


Figure 2.2 Number of Internet Users Worldwide, October 2000

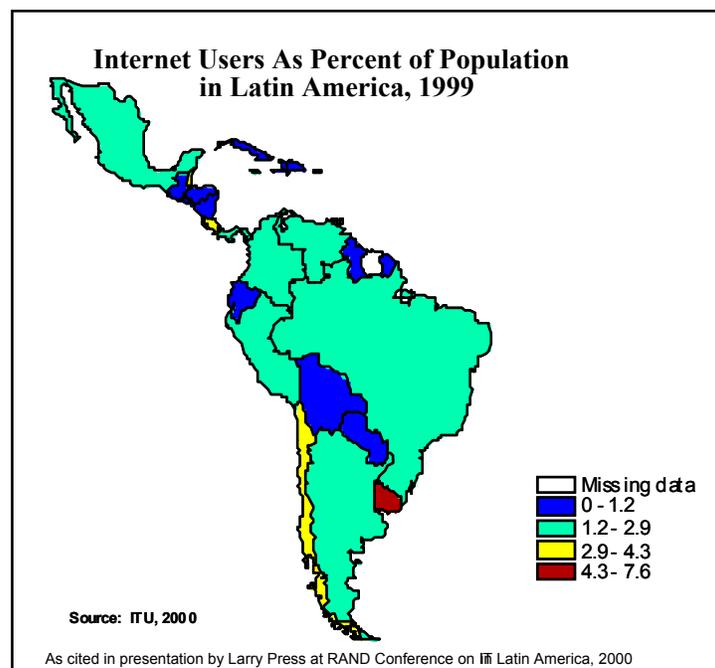


Figure 2.3 Internet Users as Percent of Population in Latin America, 1999

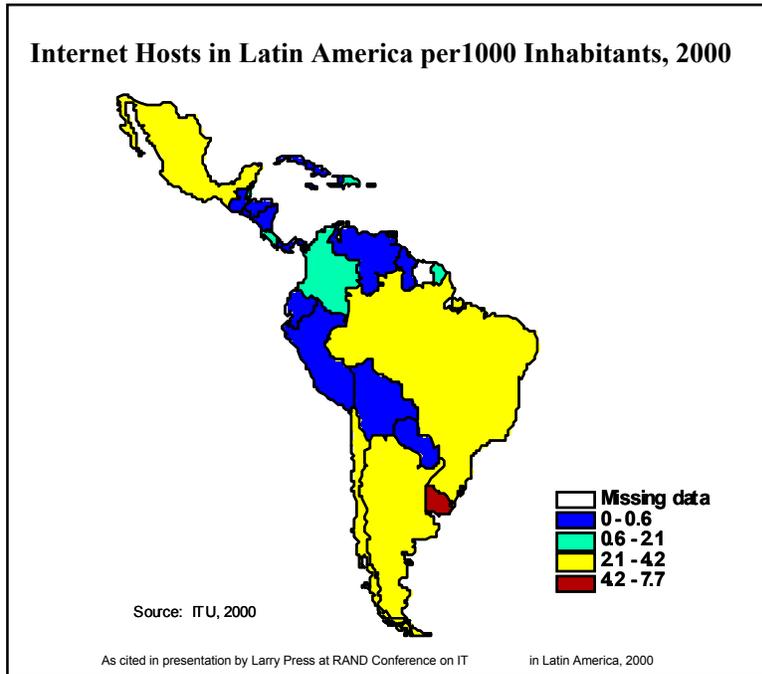


Figure 2.4 Internet Hosts in Latin America per 1,000 Inhabitants, 2000

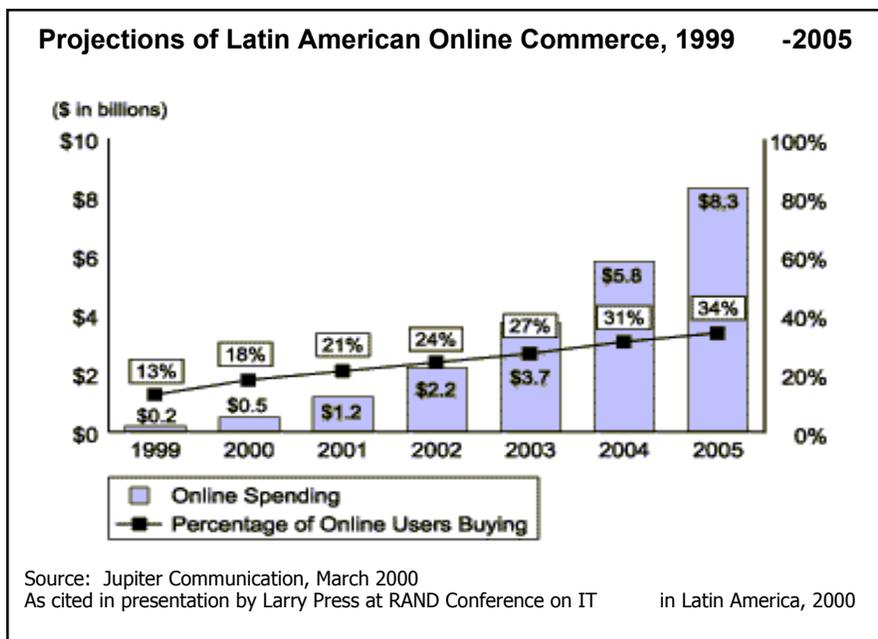


Figure 2.5 Projections of Latin American Online Commerce, 1999-2005

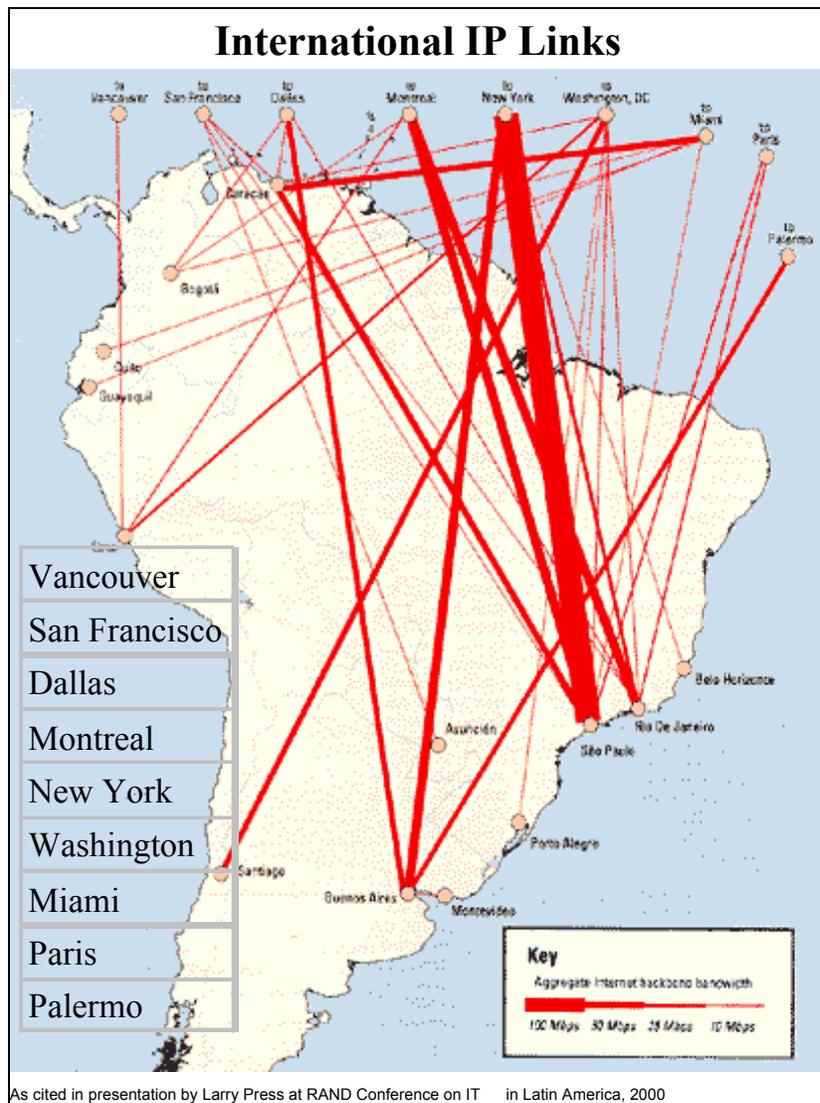


Figure 2.6 International IP Links

Bandwidth is an intriguing and important topic. On one hand, given the new fiber optic cables that are under construction or planned, bandwidth should be much less a constraint, making possible a surge in connectivity for the region. It might even have a bandwidth "glut." On the other hand, as shown in Figures 2.6 and 2.7, those cables link Latin American countries with the north, especially the United States, and with Europe, not one to another. Does the shape of those connections matter? It surely evokes concerns regarding national autonomy and security – powerful echoes in Latin America. In the short run, the main obstacle

to greater bandwidth access is price, and it is not obvious that the current hub-and-spoke arrangement of cables is more expensive than a string of low-traffic cables around Latin America would be. Prices will come down, as photonics make possible a several order of magnitude increase in bandwidth.⁶ Yet if that advance, like previous ones, is exploited fastest in the United States and Europe, they may jump ahead again, leaving Latin America just as far behind, perhaps even further.

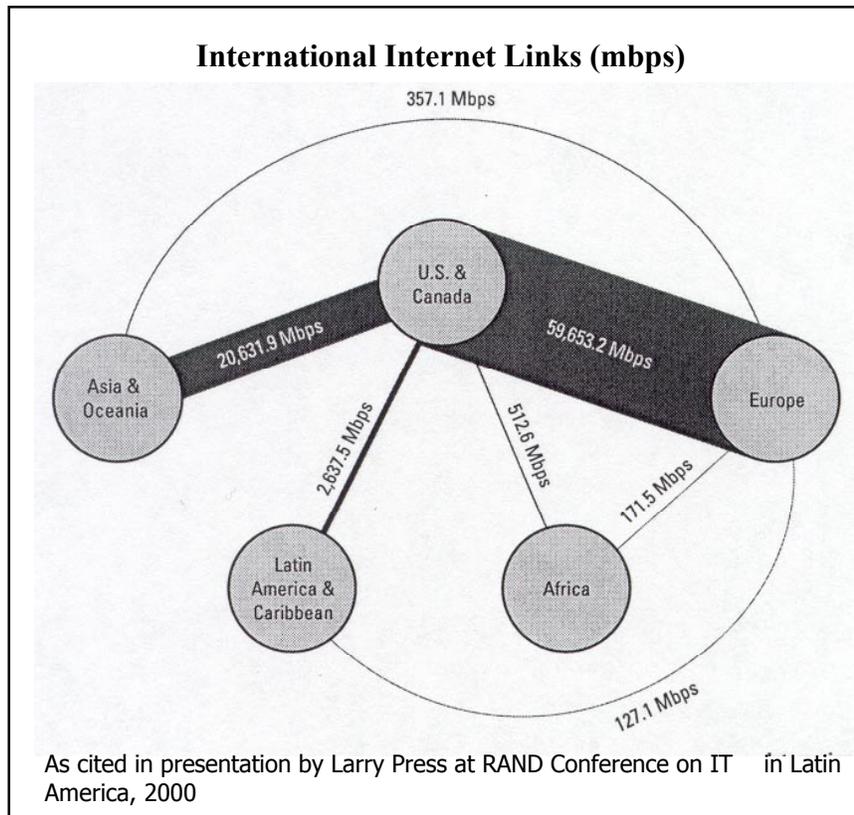


Figure 2.7 International Internet Links (mbps)

So, too, local access to the Internet and to other communications is both limited in the region and varied across it, as suggested in Figure 2.8, which shows the number and distribution of telephone main lines across Latin America.

It appears that if Latin America is to catch up, it will have to “leapfrog”; simply following the approaches taken by the United States and Europe will not let it

⁶ This is discussed in Anderson et al (2000).

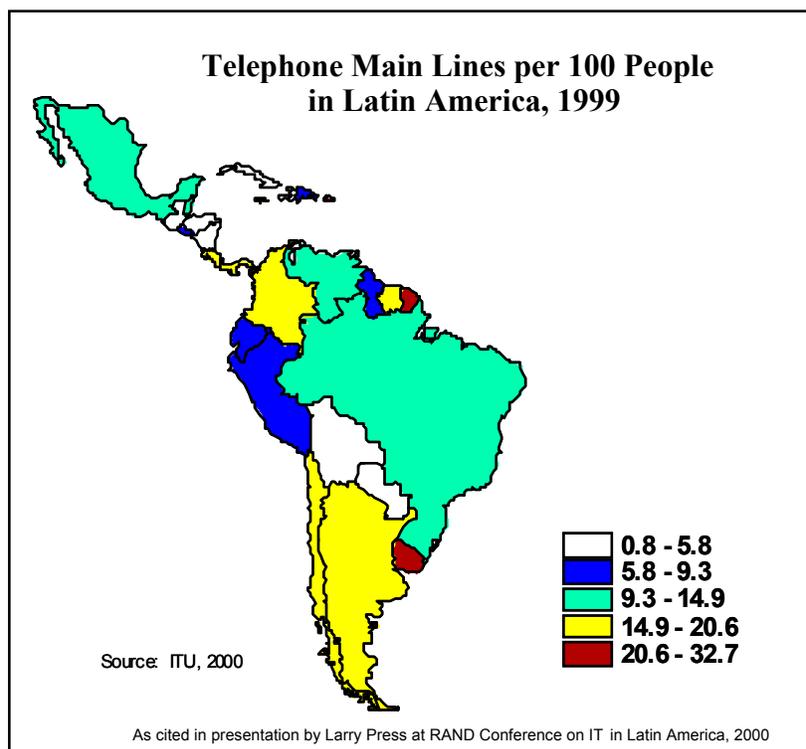


Figure 2.8 Telephone Main Lines per 100 People in Latin America, 1999

catch up with other parts of the world. New, wireless technologies may allow penetration into rural areas at a rate far faster than hard-line systems and modems would allow. (Figure 2.9 shows the current number and distribution of cellular subscribers in Latin America.) Still, while wireless technologies hold promise, they will hardly be a panacea. There are, for instance, 100 cellular providers in the region, but, alas, half of the phones are still analog. Third generation cellular phones will communicate at 3 mbps (384 kb/s in a moving vehicle), but will not be available in Latin America for several years. Moreover, some places will remain hard to reach with cellular technology.

Another technology that offers potential benefits for Latin America is satellites, in both geostationary (GEO) and low earth orbits (LEO). In contrast to recent failures, Tachyon and other companies intend to provide Internet connectivity, including voice over the Web. While such technology holds promise, there are still technical as well as regulatory problems to be overcome. The local telecom companies oppose the proliferation of voice-over technology. Of three companies providing LEO technology in the region, two are bankrupt and the third company is approaching bankruptcy – indicating pitfalls with the existing

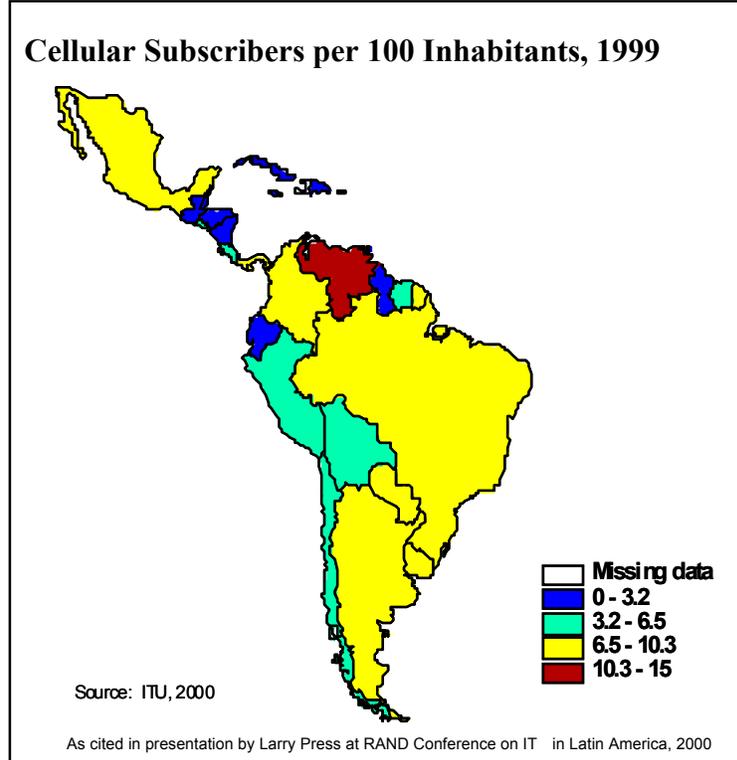


Figure 2.9 Cellular Subscribers per 100 Inhabitants, 1999

business model. The good news is that the cost of a ground station to serve a local community, community access centers, or local university, for instance, is now on the order of \$6,000, and in Peru there are now 700 *cabinas públicas* (public outlets, or kiosks) – a franchise operation serving local communities. If innovations like these continue, they may encourage Latin Americans to remain in the countryside – slowing or even reversing the rural-to-urban migratory trend.

Although various technologies offer promise for leap-frogging, technology alone is insufficient to propel the region forward in the information revolution. Human capital is critical. Latin America will need both trained, demanding users and technicians of all sorts to manage and repair networks. Some countries, such as Chile, are working to develop demanding users. In 1992, Catholic University in Chile began a five-year project to develop and evaluate an elementary school network called *Enlaces* (links). The project aimed to enhance efficiency, quality and equity in education and to "integrate the children into the culture." By the end of 2000, 100 percent of Chilean middle and high schools and 50 percent of grammar schools will have Internet-connected labs. *Enlaces* is comprehensive in

that it covers curriculum development and teacher training and collaboration as well as hardware and software. It was intended from the first to cover the entire nation, and, as such, different universities are responsible for different regions of the nation.

In addition to such elementary and secondary school projects, university networks throughout Latin America are graduating networking technicians, and the Organization of American States (OAS) provides some support in connecting networks. Despite these important efforts, however, the region still faces an uphill battle with respect to educational attainment. Only a handful of countries have adult literacy rates at or above 94 percent. As the opportunities afforded by information technology to the average person usually center around information gathering, literacy is an absolute prerequisite. In combination with the fact that only two percent of Websites were in Spanish in 1998, illiteracy is an important hurdle to be overcome in order for Latin America to successfully take advantage of the information revolution. To be sure, speech recognition and language processing is rapidly progressing, so literacy may become less of a problem.⁷ The question, though, is how rapidly those advancing technologies will diffuse to those less literate Latin Americans, most of them very poor, who need them.

Bottom Lines

The Internet did come late to Latin America, and, while it is still small relative to the rest of the world, it is growing rapidly. Numbers of end users and host computers are growing faster than the world average, but the gap between the region and the world's IT leaders is not likely to close. For the information revolution, as for roles in the global economy more generally, there is no "Latin America." Differences across the region are vast, and illustratively, the countries might be divided into three groups:

- the "leaders" – Mexico, Brazil, Argentina, Chile and Uruguay;
- the interesting, successful "outliers," like Costa Rica or some of the Caribbean islands; and

⁷ See Anderson and others (2000), p. xiii.

- the rest;

Variations across the region notwithstanding, its countries face many of the same problems in addressing the information revolution, and they seem unlikely to solve many of them by mimicking the approaches of the world's IT leaders. Outside major cities, the information revolution will not come to Latin America with hard wires and modems. It will come with new, wireless technologies, though those will hardly be a panacea.